

Observations at Melbourne, by MM. Grover and Robertson.

^{1851.}		h m s				
Feb. 1	First external contact	3	27	56	Melbourne M.T.	
	— internal —	4	47	44	—	—
	Last — —	4	52	48	—	—
	— external —	6	2	3	—	—

Observations at Sydney, by Mr. A. Longmore.

Latitude $33^{\circ} 53' 30''$ S.; longitude $10^{\text{h}} 5^{\text{m}} 26^{\text{s}}$ E.

^{1851.}		h m s				
Feb. 1	First contact	4	7	44	Sydney M.T.	
	Last — —	6	32	58	—	—

Observations at Yarrowlumla, by Mr. Murray.

Latitude $35^{\circ} 19'$ S.; longitude 149° E.

The following is the substance of Mr. Murray's account:—
 "The annularity was decided here. We were evidently considerably within its northern limit, as the annularity lasted exactly 3^{m} . The disc of the moon appeared streaked by five stationary lines; its surface appeared rough. There was a slight glow of light over its dark face, on the upper part; its edges were uneven all round, but presented no striking irregularities. When the moon had passed over about a third of the sun, a deep crimson glow seemed to pass over his face, extended to the upper cusp, and then disappeared. On three occasions the cusps of the sun seemed blunted; but perhaps a little fatigue of the eye may account for all these appearances."

"At the commencement of the eclipse the thermometer in the shade stood at 82° , and, when exposed to the sun, at 93° . It fell during the annular phase to 77° , and by the end of the eclipse had risen to 86° ."

Using Mr. Woolhouse's formulæ and the data of the *Nautical Almanac*,* Captain King has computed the following longitudes:—

		h m s				
Paramatta	{ By beginning	10	4	14.3	East.	
	{ — end	10	3	58.3	—	
Melbourne	{ By beginning	9	39	52.6	East.	
	{ — end	9	39	54.1	—	

On the Determination of Elliptic Orbits. By M. Benjamin Valz.

In the *Connaissance des Temps* of 1835, the author gave a method for calculating directly the orbits of comets, sufficient for obtaining the first approximation to the elements, to be rectified afterwards

* It must not be forgotten that the data of the *Nautical Almanac* can only be relied upon within the limits of accuracy of the Solar and Lunar Tables, which are as yet far from perfection.

by the calculation of the interval of time. It remained for him then to apply the same method to the determination of elliptic orbits, the number of which is constantly increasing, both by the discovery of additional small planets and comets of short period.

M. Valz takes the opportunity to clear up an historical difficulty relative to the first methods employed in the calculation of the orbits of comets, and to give some proof of what he had advanced in the preceding memoir, viz. that Bradley appears to have employed in his calculations the same steps, followed by Lacaille afterwards, without any other modification than some differences in the mode of computation.

He cites several passages from Delambre's *Astronomy of the Eighteenth Century*, and endeavours to prove that the latter has inadvertently misrepresented, in some degree, the methods of Lemonnier, which, when properly understood, tend to prove the author's views respecting Bradley's methods.

M. Valz then proceeds to explain his method of computing elliptic orbits, referring for the basis of the method to the memoir in the *Connaissance des Temps*. He gives formulæ by means of which, with the assistance of a table appended to the memoir, the true distance of the planet or comet from the earth can be computed; he then gives formulæ for computing the values of the radii-vectores, and the difference of the extreme anomalies: and, finally, for the computation of the elements of the orbit.

For more readily obtaining the excentric from the mean anomaly, he gives, for every 10° of excentric anomaly (x), a small table of the values of $\frac{\sin x}{\sin 1^{\circ}}$; he adds also a table for determining the limits and extent of the double solution in the determinations of orbits.

Finally, he gives an example of the application of the method, with the computations in detail.

Extract of a Letter from Mr. Graham, of Mr. Cooper's Observatory, Markree Castle.

“A continued effort, during the past year, to determine the places of as many new stars as possible for insertion in our maps, and the consequent necessity for taking advantage of every favourable opportunity, in a climate where such seldom occurs, will account for our having done so little in the way of observing planets and comets. In the examination of comets especially, excellent as are our instrumental means, little can be done. Many, and among these some of the later ones, have escaped us altogether. Our observing nights commonly fail about 10 or 11 o'clock: we are hence obliged to begin our regular work as soon as it is dusk enough for our purpose. We have pursued our object steadily, and have, notwithstanding all the disadvantages of climate, been able to make some progress toward its accomplishment.

“ With our proceedings up to the end of 1850 you are fully acquainted. The places of nearly 15,000 stars have, at the expense of the Government, been given to the public.* Situate in the most interesting zone of the heavens, and all, with an occasional exception, previously undetermined, it is hoped that this tribute to science will not be without its value. From the observations taken last year, we are able to make a gross addition of upwards of 12,000 stars. These are not all new, but the number of known stars included will not materially affect the total. The observations experience so many interruptions that the reductions nearly keep pace with them, and we shall soon be in a condition to arrange these stars also in a catalogue.

“ Nearly all the stars known, from published catalogues or from our own observations, within the prescribed limits, have been inserted in maps, through 9 hours of right ascension. Each map embraces 8° in right ascension, and as much in declination. Their scale is four times larger than that of the Berlin maps, that is to say, nearly two inches to a degree. All the stars can thus be inserted without presenting a crowded appearance, and their magnitudes to the 12th distinctly exhibited. The epoch is 1850.0. The labour of reducing the stars of Bessel, Lalande, &c., up to this epoch, which is done with all requisite regard to accuracy, is by no means light.

“ We are well aware that, in adopting this course, we are labouring for the future advantage of other astronomers rather than for greatly facilitating our own researches. To keep up anything like a constant survey of the heavens where, for weeks together, neither sun nor star is visible, is out of the question.

“ I should mention that arrangements are made whereby, it is hoped, our contributions to your valuable *Notices* during this year shall be more regular. Mr. Cooper, with his wonted munificence, has had an eye-piece executed for the large equatoreal, which promises to be of considerable advantage in extra-meridional observations. With a considerably higher power than we have ordinarily used, it gives a larger and flatter field, and a very sharp definition. An adapter for the examination of solar maculæ has lately been applied by Mr. Cooper to his telescope. It is furnished with a drum of 9 inches diameter, containing alum water between parallel glasses. With the aid of this appendage, Mr. Cooper observed the late solar eclipse, using the whole aperture of the telescope, having no further defence than a pair of dark spectacles.

“ In addition to the valuable personal assistance afforded by Mr. Cooper, as well in superintending the operations as in actually observing and preparing the stars for the catalogue, he has nearly concluded the transcription of his notes on comets for the printer. His catalogue of cometic orbits, containing upwards of 200 appa-

* Catalogue of Stars near the Ecliptic, observed at Markree during the years 1848, 9, 50, and whose places are supposed to be hitherto unpublished. Vol. i. containing 14,888 stars. Printed at the expense of her Majesty's Government, on the recommendation of the Royal Society, Dublin, 1851.

ritions, with notes, is now ready for publication. This work not only contains a complete list of the best orbits of all the comets which have been computed, but also extensive notes relative to the physical phenomena, &c. which have been remarked in these bodies, along with copious references; it will thus be a complete manual of what is known on the subject up to the present time. I allude to these facts to show that it is not merely for the large pecuniary outlay which such an institution involves that astronomy is indebted to Mr. Cooper, but, in addition, for his personal and unwearied exertions."

On the Longitude of the Observatory of Durham, as found by Chronometric Comparisons in the Year 1851. By Mr. R. C. Carrington.

When the observatory was first established, in the year 1841, its approximate longitude was found by trigonometrical measurement of its distance west from the cathedral, as given in a general survey; and $6^m 18^s$ west, neglecting portions of a second, was adopted to start with: this value appears in the *Nautical Almanac*. By observations of the moon and moon-culminating stars in the years that followed, it was found that $6^m 19^s$ was nearer to the truth, but there still remained an uncertainty of more than half a second. At the last meeting of the Observatory Syndicate, in the year 1850, it was decided that a determination by chronometric comparison should be forthwith obtained. The Astronomer Royal was written to, and granted his permission for the necessary access to the transit-instrument at Greenwich; and application was made to Messrs. Reid, of Newcastle, for the chronometers. Six were sent, three pocket and three marine box-chronometers: the latter only were found, on trial, to be suitable for the purpose. They were received on Jan. 4, 1851, and rated daily till the 17th by comparison with the transit-clock. The first up-journey was made on the night of Jan. 17, the first down-journey on the 27th, by railway, the chronometers lying, in the interval, in the chronometer-room of the Royal Observatory, and rated daily along with those on trial for the Admiralty. I secured a sufficient number of clock-stars before leaving Durham, on arrival at Greenwich, before departure, and after arrival on the return; so that the first journey was rendered independent of personal equation. The second journey up was made by night mail-train on Feb. 4. I arrived at Greenwich on the 5th, at $2^h 1^m$, and returned to Durham the same night, the state of the sky at Greenwich giving no hopes of obtaining observations for clock-error. Transits were obtained at Durham on the 4th, before departure, and on the 6th, after return; so that the second journey is affected only by a slight uncertainty in the assumed rate of the transit-clock at Greenwich, and in the personal equation applied.

My personal equation was determined by the transit-observa-